

## **BIPED TOY THAT CAN WALK ON TWO FEET**

### **BACKGROUND OF INVENTION**

#### **1. Field of the Invention**

The present invention relates to a biped toy that can walk on two feet walks by lifting up legs maintaining a balance only by mechanical composition.

#### **2. Description of the Related Art**

A prior art of biped toy that can walk on two feet is disclosed by this applicant in Japanese Patent application No. 2001-259245 which was published.

The biped toy of this invention differs from the toys walking as sliding their feet which is typical walking movement of conventional technology, and said invention is enable to walk lifting up one leg with keeping away from the supporting surface completely maintaining a balance of a toy body by achieving a shifting weight and center of gravity of leg portions. Therefore, the walking movements of this toy can be naturally as a human being walks by lifting up each step at a time.

Said toy have been receiving a good reputations however, some consumer expected that said toy would be much smaller and more competitive price.

The present invention has been made in view of offering the product that is smaller and competitive price with inheriting a walking movement of the prior art which is shifting the weight of the toy main body and shifting the center of gravity of leg portions, and by simplifying the body mechanism.

### **SUMMARY OF THE INVENTION**

With a view to attaining the object, according to a first aspect of the present invention, there is provided a biped toy that can walk on two feet.

The toy of the present invention has means for making consecutive walking movement by shifting the weight of said toy main body by stepping forward one leg with positioning a center of gravity of said toy main body on another leg and by repeating a consecutive movement which shifts the center of gravity between right and left said leg portions by driving said foot portions with each movements toward rolling direction. The toy includes a leg portion and arm portion activated by a driving means which is set interior of a torso, a motor or wind-up-type of driving means interior of said torso, a foot portion which is rotated in a rolling direction of said toy main body and a leg portion which is driven to cross and up-and-down direction of said toy main body at the bottom of said torso, and the first link member which drives said leg portion by making circular motion remaining mounting angle against said torso and second link mechanism which mounted link member which is driven said foot portions by moving up-and-down.

The present invention consists only of simple mechanical compositions without using sensor and the like. Since the toy can walk lifting up one leg with keeping away from the supporting surface completely, the biped toy can be offered in smaller size and competitive price as natural as human being walks.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Further objects and advantages of the present invention will be apparent from the following description with reference to the accompanying drawings, where in:

Fig. 1 is a perspective view showing the external appearance of an embodiment of the present invention;

Fig. 2 is an exploded perspective view showing a toy composition in Fig. 1;

Fig. 3 is a diagram explaining a movement of the leg portion of a toy in Fig. 1;

Fig. 4 is a diagram explaining a movement of the foot portion of a toy in Fig. 1;

Fig. 5 is elements on larger scale of the foot portion of a toy in Fig. 1;

Fig. 6 is a diagram explaining a movement of the arm portion of a toy in Fig. 1;

### **DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT**

The particulars shown herein are by way of example and for purpose of illustrative discussion of an embodiment of the present invention. The description taken with the drawings makes it apparent to those skilled in the art how the present invention may be embodied in practice.

First, referring to Fig.1, an abstract of the present invention will be described.

Fig. 1 is a perspective view showing the embodiment of the present invention. A toy main body 1 includes a torso 2, a left leg portion 3A, right leg portion 3B, left foot portion 4A, right leg portion 4B, left arm portion 5A, right arm portion 5B, and a head portion 6. The left leg portion 4A, the right leg portion 4B, the left arm portion 5A, and right leg portion 5B are driven by the motor type driving means mounted inside of the torso 2. The head portion 6 is set on said torso 2 and does not make any motion.

Next, referring to Fig. 2, a composition of driving means and said movement will be described.

The driving means in the present embodiment includes a set of toothed gear portion that is engagement relationship with a motor mounted inside of a middle case 23 of said torso 2. The motor is also connected electrically with a battery mounted inside of the middle case 23, and a main switch 9 will operate a switching on and off mode. When said motor is rotated by operating the main switch 9, an output shaft which is stretched out from said middle case 23 through the set of toothed gear portion will be rotated and a cum 81 which is connected to the output shaft will be rotated. The cum 81 is mounted on a both side of said middle case 23, and each said cum is placed in a 180-degree phase difference.

Next, referring to Figs. 2 and 3, a composition of a left leg portion 3A and its movement will be described.

Fig.3 is a diagram explaining a movement of a leg portion of a toy in Fig. 1, only the necessary parts for explaining a movement of the leg portion are described and the unnecessary parts are omitted as a matter of convenience in this diagram.

The left leg portion 3A includes the first link member 33, the third link member 42, a cover of an upper leg portion 31 and a cover of a lower leg portion 32. Inside of the cover of under leg portion 32, two shafts for holding position are

formed, and said shaft will be formed by fitting to the fitting part 42a formed in the first link member 33. The cover of the upper leg portion 31 is formed inside of the cover of the lower leg portion 32 to fit a groove 31a which is formed the bottom to the 32a shaft of the cover of the lower leg portion 32, the whole 31b of the cover of upper parts of member is supported by the shaft 21b formed inside of the left case 21.

The first link member 33 is driven by rotation of the cam 81, and supported by the assistant cams 82 and 83 which are mounted rotatably. The assistant cams 82 and 83 are mounted rotatably on the middle case 23, loosely inserted to the hole 33a and 33b which is mounted on the first link member 33 *mounted by the shaft 82b and 83b*. Therefore, when the cam 81 rotates, the first link member 33 will rotate upon the shaft 81a of cam 81 with remaining the mounting angle against the torso 2, whereby the leg portion are allowed to lift to upper direction and make the first steps.

In addition, Fig. 3 shows only the composition of the left leg portion 3A, however, the right leg portion 3B, which is not shown in Fig. 3, is composed symmetrically. The cam which drove the leg portion 3B is mounted on the same shaft with cam 81 in a 180-degree phase difference, so that the left leg portion 3A and right leg portion 3B are allowed to walk by shifting each steps.

Next, referring to Figs. 2, 4, and 5, the composition of the left leg portion 4A and its movement will be described.

Fig. 4 is a diagram explaining a movement of a leg portion of a toy in Fig. 1, only the necessary parts for explaining a movement of the leg portion are described and the unnecessary parts are omitted as a matter of convenience in this diagram.

Fig. 5 is elements on larger scale of the foot portion of a toy.

The left leg portion 4A is secured to the bottom part of the first link member 33 by the shaft 4b, and insert loosely the shaft 42c which is mounted under the third link member 42 to the securing part 4a. Therefore, the left leg portion 4A is driven to the rolling direction by the up-and-down movement of the third link member 42. The third link member 42 is connected by inserting loosely the shaft 42b to the hole 41c which mounted on the second link member 41 trembling on a center of the shaft 41 a as a center.

In addition, the cam 81 and the upper member of 41b are contacted to the second link member 41, and said second link member is push down by the rotation of the cam 81. The second link member 41 is braced in anticlockwise direction by the spring 7 to allow contacting all the time to the cam 81. The spring 7 is inserted loosely to the shaft 41a, one side is held to the shaft 23c, other side to the shaft 41d.

As explained hereinbefore, the leg portion and foot portion are comprised and both members are driven at the same time to allow performing the steps when the toy is operated. Namely, the movements of the leg portion by rotating the first link member 33 takes a role of performing the forward movement of the toy (shifting the weight of a toy main body), and the inclining of the rolling direction of foot portion takes a role of controlling the balance of torso (shifting the center of gravity of the leg portion).

Following is an assumed situation that the left leg portion 4A connects to ground.

When said left foot portion 4A connects to ground and the right leg portion 4B is stepped forward, toy main body is supported by the left leg portion 3A and the center of gravity is positioned on the leg foot portion 4A. In which state the left foot portion 4A inclines to the left side, therefore the toy main body is inclined as well, wherewith the balance between the right foot portion which is not connecting to ground and the weight of the right side of the toy body allowed to maintain. While the center of gravity is positioned on the leg foot portion 4A, the right leg portion 3B is stepped forward, whereat the left foot portion 4A inclines to the right side to shift the center of gravity of the toy to the right foot portion 4B.

Thereafter, the right foot portion 4B connects to ground, so that the right leg portion 3B supports the toy main body, and the center of gravity is to be positioned on the right foot portion 4B. In which state the right foot portion 4B inclines to the right side, therefore the toy main body is inclined as well to the right side, wherewith the balance between the left foot portion which is not connecting to ground and the weight of the left side of the toy body allowed to maintain. While the center of gravity is positioned on the right foot portion 4B, the left leg portion 3A is stepped forward.

By repeating these series of actions the toy main body can walk on two feet as natural as the human being walks.

Next, referring Figs 2 and 6, the composition of the left arm portion 5A and its movement will be described.

Fig. 6 is a diagram explaining a movement of an arm portion of a toy in Fig. 1, only the necessary parts for explaining a movement of the arm portion are described and the unnecessary parts are omitted as a matter of convenience in this diagram.

The left arm portion 5A is connected to the cam 84 through the left case 24 as follows. The hole 21a is formed on the left case 21, and the cam 84 is inserted loosely. The arm portion 5A is put by hitching the peg inserted loosely to the how 51 mounted on the member to the hole 84b mounted on the cam. The holding groove 84a mounted on the cam 84 is held on the shaft 33d mounted on the first link member 33. Therefore, when the first link member 33 is driven, the left arm portion 5A starts to operate at the same time.

In addition, Fig. 6 shows only the component of the left arm portion 5A, the right arm portion 5B which is not shown is composed symmetrically. The cam which drove the right leg portion 3B is mounted on the same shaft with cam 81 in a 180-degree phase difference, so that the left arm portion 5A and right arm portion 5B are allowed to wave each arm one after the other.

Thus, while the embodiment of the present invention has been described heretofore, the present invention is not limited to what has been described and can be expanded as follows.

While the component which is operated by a on and off mode switch connected directly to the motor of the toy main body in said embodiment examples, for example, the toy can be composed for operating by the remote control from the distant place by mounting the remote control device. This remote control device can be a wired type, ultra rays, visible light, or wireless type using electric wave or ultrasonic wave. By using these types of operation devices, not only enables to change the movement of direction from forward to backward by reversing the motor directions, but also adjusting the motor rotation number enabling to change the speed of walking, the present invention can provide more